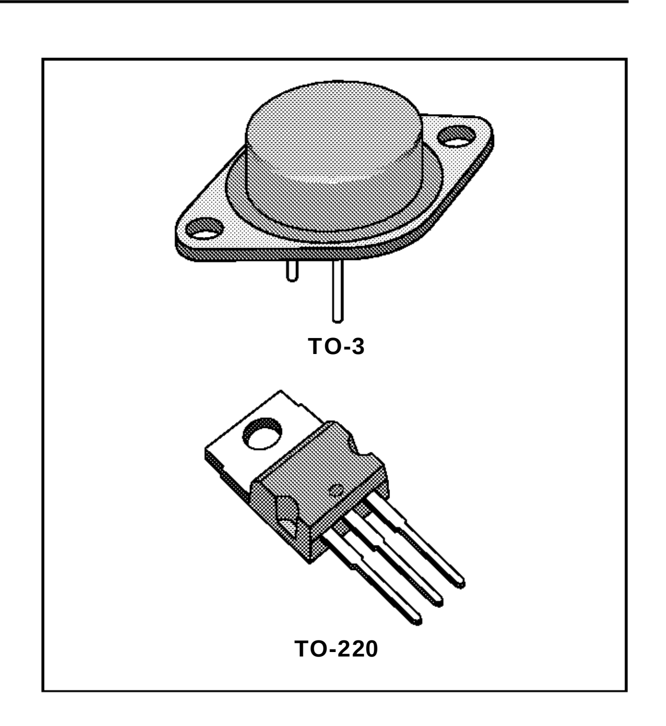
SGS-THOMSON MICROELECTRONICS

LM123/LM223 LM323

THREE-TERMINAL 3A-5V POSITIVE VOLTAGE REGULATORS

- OUTPUT CURRENT : 3A
- INTERNAL CURRENT AND THERMAL LIMITING
- TYPICAL OUPUT IMPEDANCE : 0.01Ω
- MINIMUM INPUT VOLTAGE : 7.5V
- POWER DISSIPATION : 30W



DESCRIPTION

The LM123, LM223, LM323 are three-terminal positive voltage regulators with a preset 5V output and a load driving capability of 3A. New circuit design and processing techniques are used to provide the high output current without sacrificing the regulation characteristics of lower current devices.

The 3A regulator is virtually blowout proof.

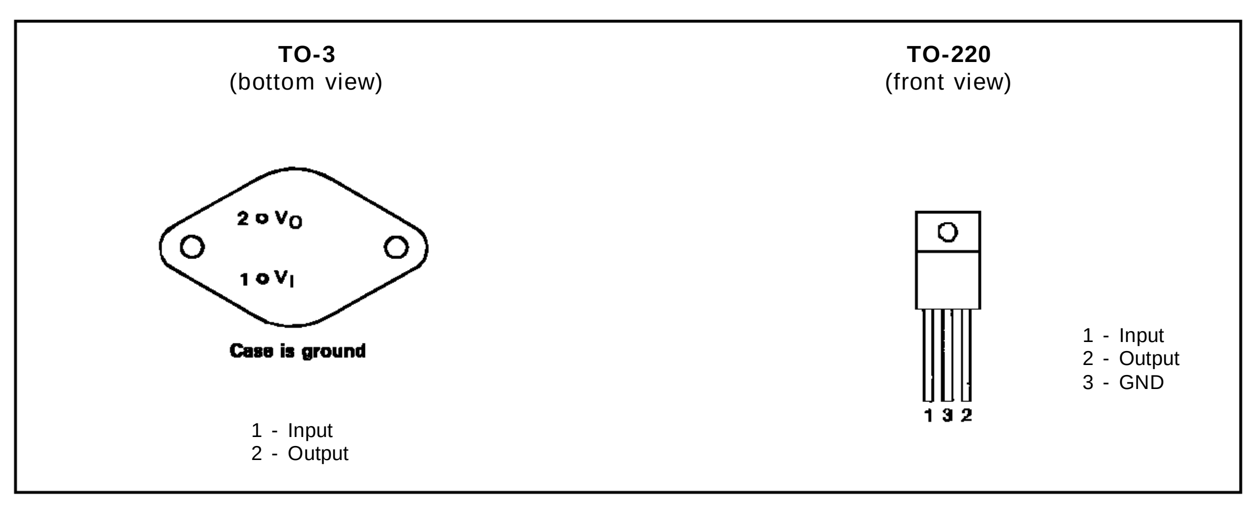
Current limiting, power limiting and thermal shutdown provide the same high level of reliability obtained with these techniques in the LM209, 1A regulator.

An overall worst case specification for the combined effects of input voltage, load current, ambient temperature, and power dissipation ensure that the LM123, LM223, LM323 will perform satisfactorily as a system element.

ORDER CODES

Part Number	Temperature Range	Package	
		K	T
LM123	-55 °C to 150 °C	•	
LM223	-25 °C to 150 °C	•	
LM323	0 °C to 125 °C	•	•

PIN CONNECTION



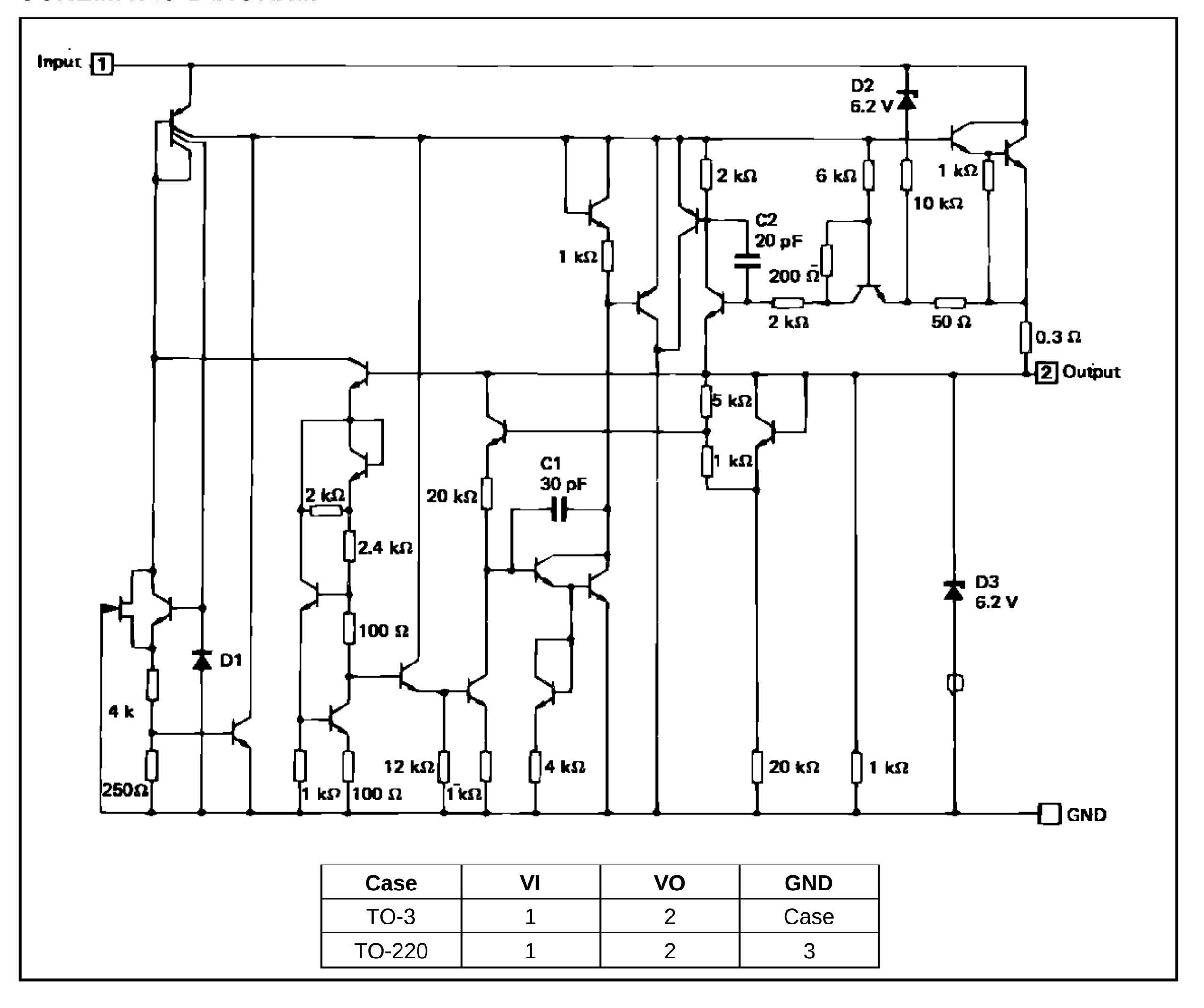
ABSOLUTE MAXIMUM RATING

Symbol	Parameter		Value	Unit
V_I	Input Voltage		20	V
I_O	Output Current		Internally Limited	
P_{tot}	Power Dissipation		Internally Limited	
T_{oper}	Operating Junction Temperature Range	LM123	-55 to 150	^oC
		LM223	-25 to 150	
		LM323	0 to 125	
T_{stg}	Storage Temperature Range		-65 to 150	^oC

THERMAL CHARACTERISTICS

Symbol	Parameter		Typ.	Max.	Unit
$R_{thj\text{-}case}$	Junction-case Thermal Resistance	TO-3	2		$^oC/W$
		TO-220		3	
$R_{thj\text{-}amb}$	Junction-ambient Thermal Resistance	TO-3		35	$^oC/W$
		TO-220		50	

SCHEMATIC DIAGRAM



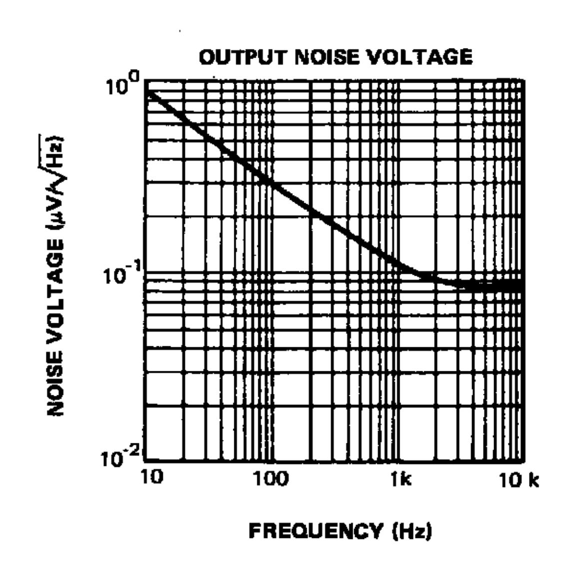
Case	VI	VO	GND
TO-3	1	2	Case
TO-220	1	2	3

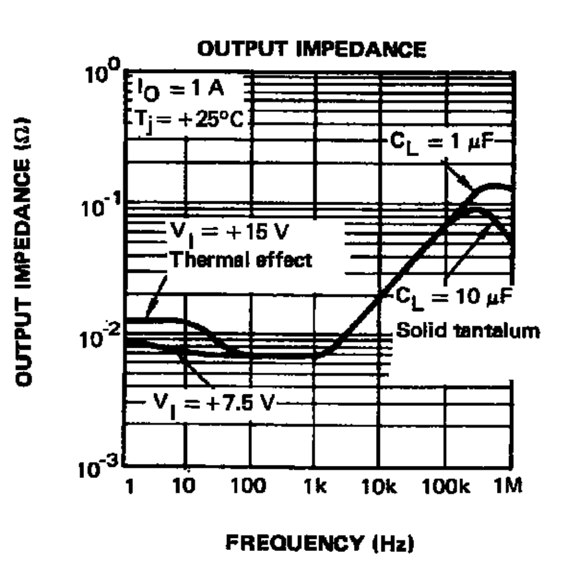
ELECTRICAL CHARACTERISICS

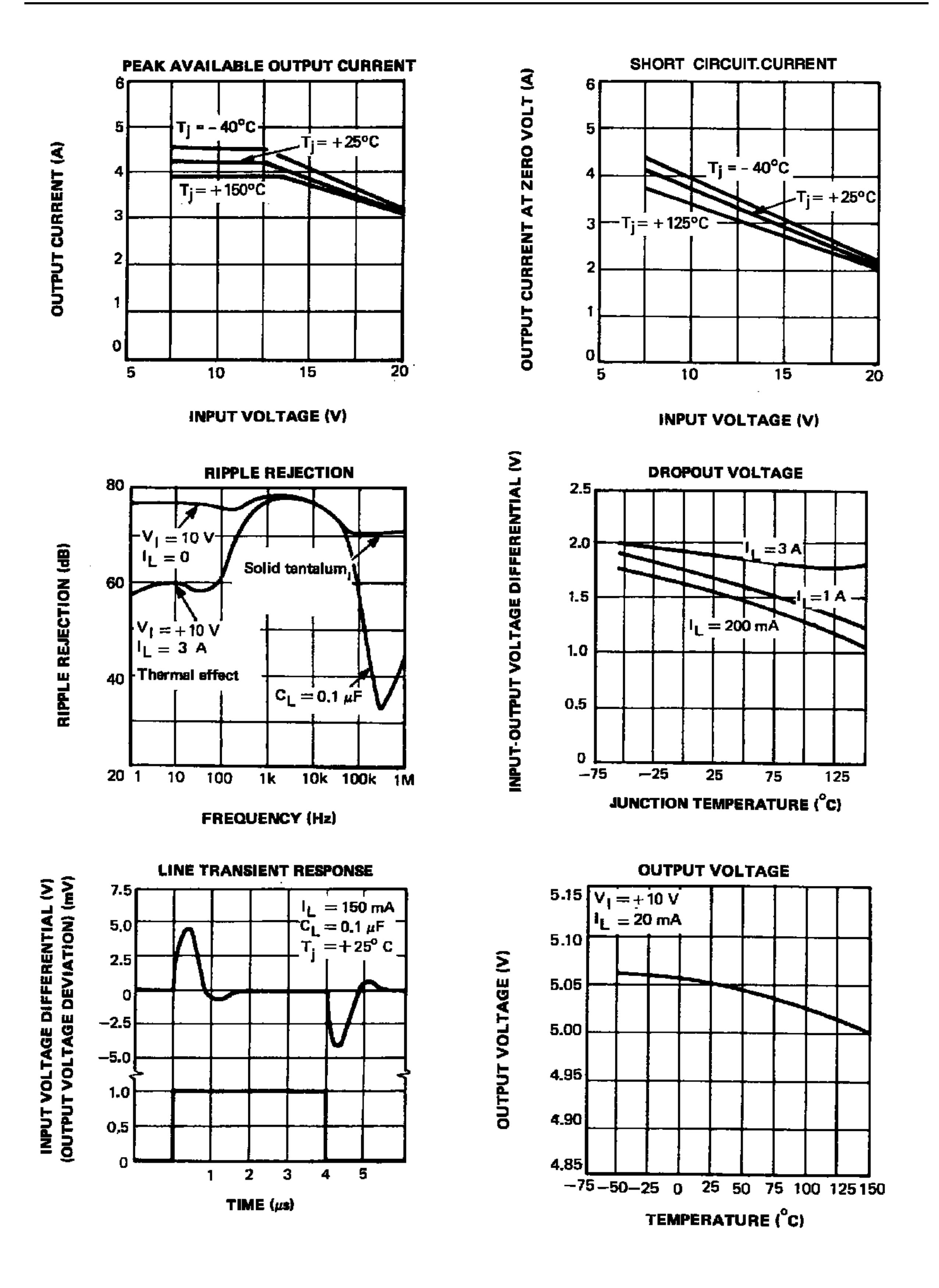
LM123: -55 °C < Tj < 150 °C
LM223: -25 °C < Tj < 150 °C
LM323: 0 °C < Tj < 150 °C

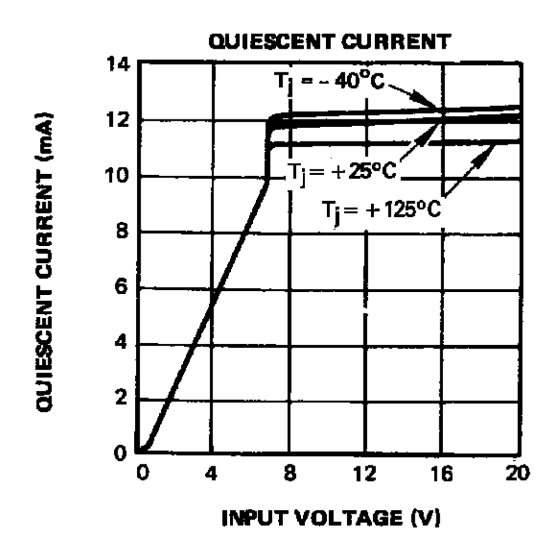
Symbol	Parameter	LM123/LM223			LM323			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_O	Output Voltage Range (Note 2) T_{amb} = 25 °C, V_I = 7.5 V, I_O = 0	4.7	5	5.3	4.8	5	5.2	V
V_O	Output Voltage Range (Note 2) $T_{min} \leq T_j \leq T_{max}$, $P \leq P_{max}$ 7.5 V ≤ V_I ≤ 15 V, 0 ≤ I_O ≤ 3 A	4.6		5.4	4.75		5.25	V
K_{VI}	Line Regulation (Note 3) T_j = 25 °C, 7.5 V ≤ V_I ≤ 15V		5	25		5	25	mV
K_{VO}	Load Regulation (Note 3) T_j = 25 °C, V_I = 7.5 V, 0 ≤ I_O ≤ 3 A		25	100		25	100	mV
I_{IB}	Quiescent Current 7.5 V ≤ V_I ≤ 15 V, 0 ≤ I_O ≤ 3 A		12	20		12	20	mA
V_{NO}	Output Noise Voltage T_{amb} = 25 °C, 10 Hz ≤ f ≤ 100 KHz		40			40		μV_{rms}
I_{OS}	Short Circuit Current Limit (T_j = 25 °C) V_I = 15 V V_I = 7.5V		 3 4	 4.5 5		 3 4	 4.5 5	 A A
K_{VH}	Long Term Stability			35			35	mV

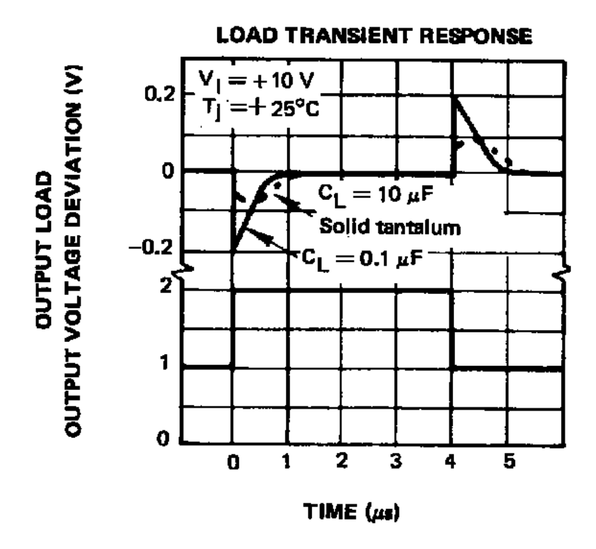
Notes : 1. Although power dissipation is internally limited, specifications apply only for P ≤ 30W.
2. Selected devices with tightened tolerance output voltage available.
3. Load and line regulation are specified at constant junction temperature. Pulse testing is required with a pulse width ≤ 1ms and a duty cycle ≤ 5%.





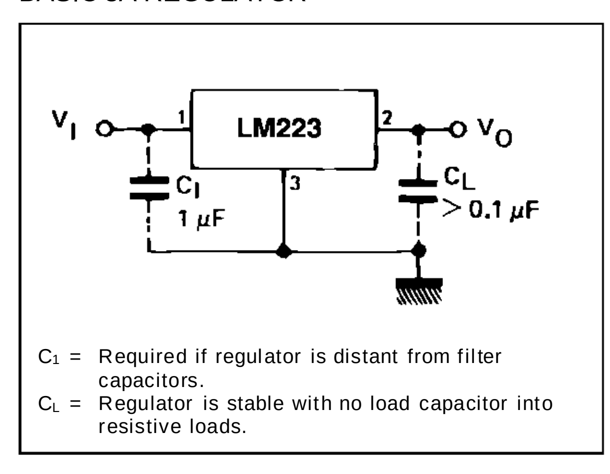

PEAK AVAILABLE OUTPUT CURRENT
OUTPUT CURRENT (A)
INPUT VOLTAGE (V)
Tj = - 40°C
Tj = +25°C
Tj = +150°C
SHORT CIRCUIT.CURRENT
OUTPUT CURRENT AT ZERO VOLT (A)
INPUT VOLTAGE (V)
Tj = - 40°C
Tj = +25°C
Tj = +125°C
RIPPLE REJECTION
RIPPLE REJECTION (dB)
FREQUENCY (Hz)
VI = 10 V
IL = 0
Solid tantalum
VI = +10 V
IL = 3 A
Thermal effect
CL = 0.1 μF
DROPOUT VOLTAGE
INPUT-OUTPUT VOLTAGE DIFFERENTIAL (V)
JUNCTION TEMPERATURE (°C)
IL = 3 A
IL = 1 A
IL = 200 mA
LINE TRANSIENT RESPONSE
INPUT VOLTAGE DIFFERENTIAL (V)
(OUTPUT VOLTAGE DEVIATION) (mV)
TIME (μs)
IL = 150 mA
CL = 0.1 μF
Tj = +25° C
OUTPUT VOLTAGE
OUTPUT VOLTAGE (V)
TEMPERATURE (°C)
VI = +10 V
IL = 20 mA





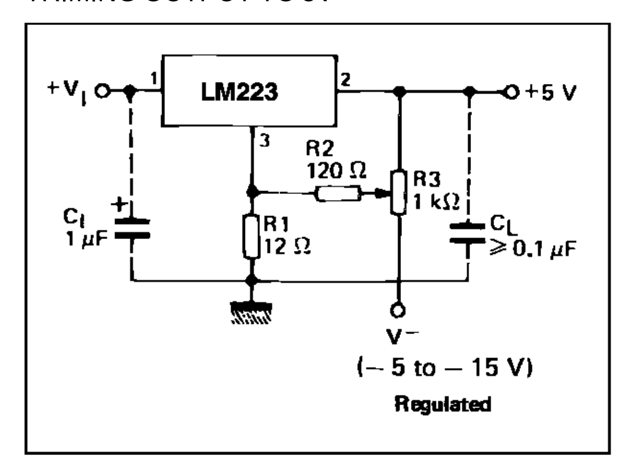
TYPICAL APPLICATIONS

BASIC 3A REGULATOR

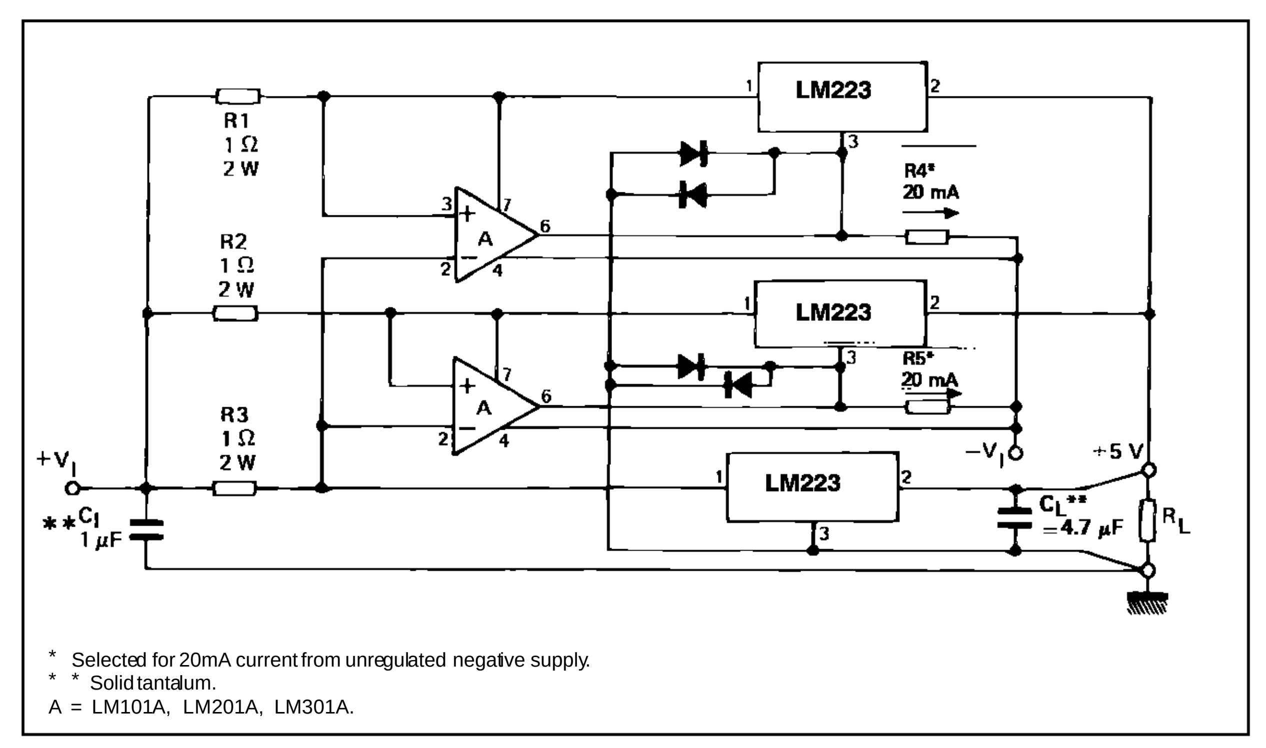


C_1 = Required if regulator is distant from filter capacitors.
C_L = Regulator is stable with no load capacitor into resistive loads.

TRIMING OUTPUT TO 5V

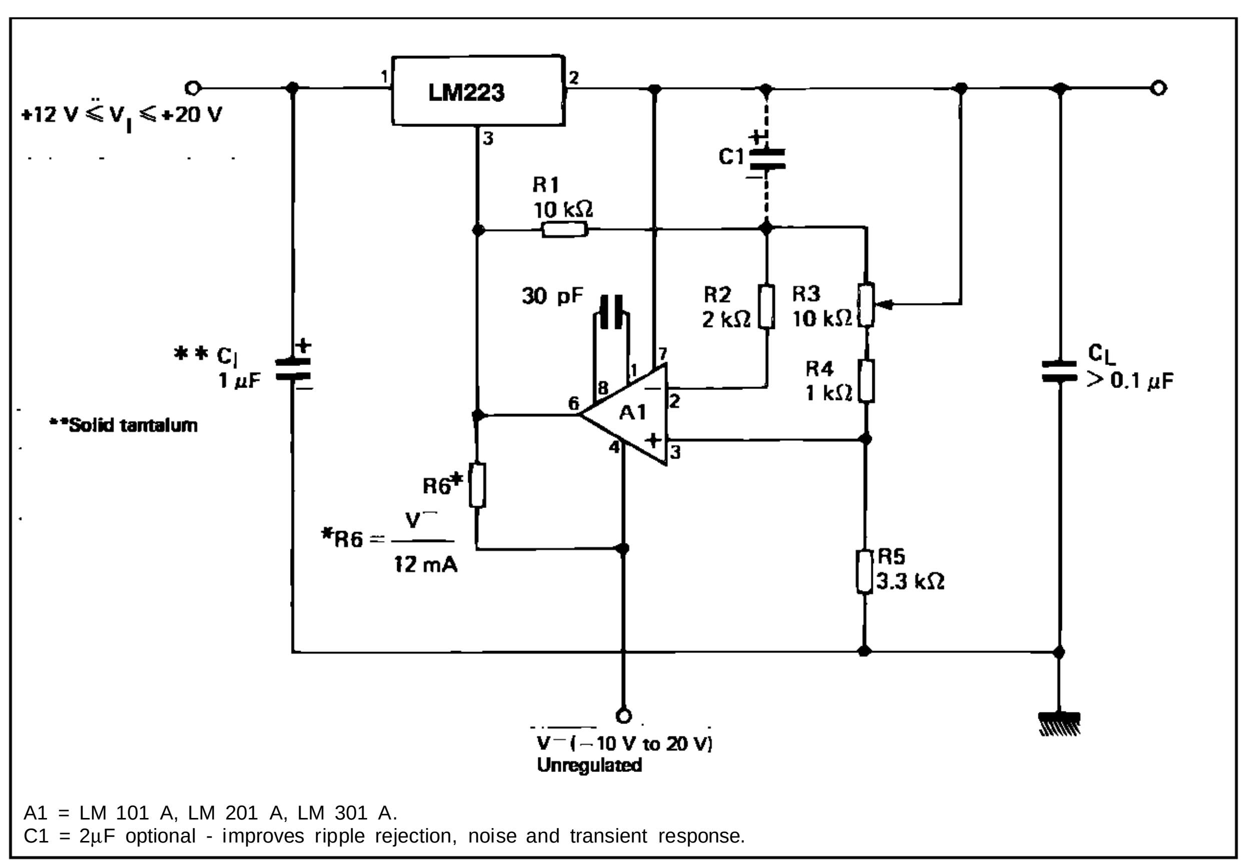


10A REGULATOR WITH COMPLETE OVERLOAD PROTECTION



* Selected for 20mA current from unregulated negative supply.
* * Solid tantalum.
A = LM101A, LM201A, LM301A.

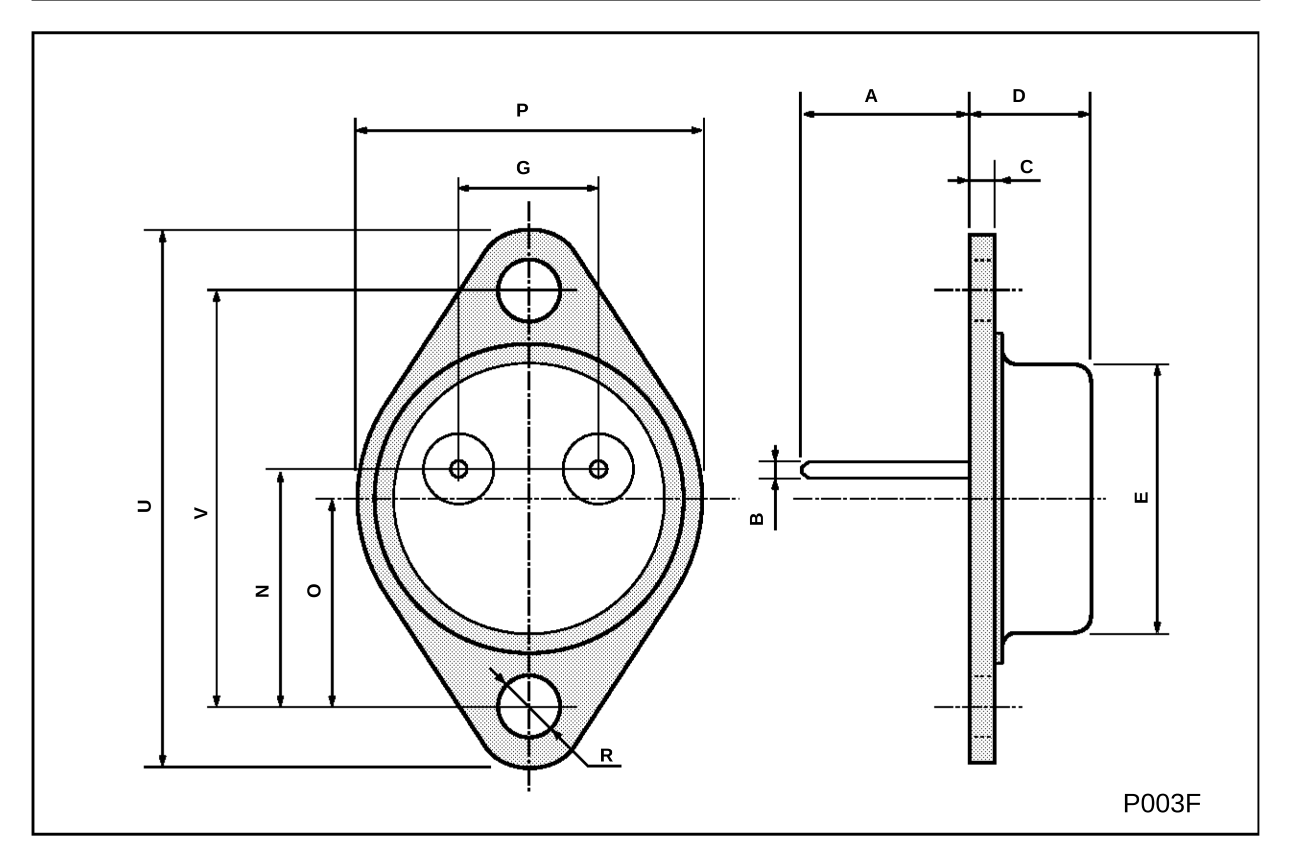
ADJUSTABLE REGULATOR 0 – 10V/3A



A1 = LM 101 A, LM 201 A, LM 301 A.
C1 = 2µF optional - improves ripple rejection, noise and transient response.

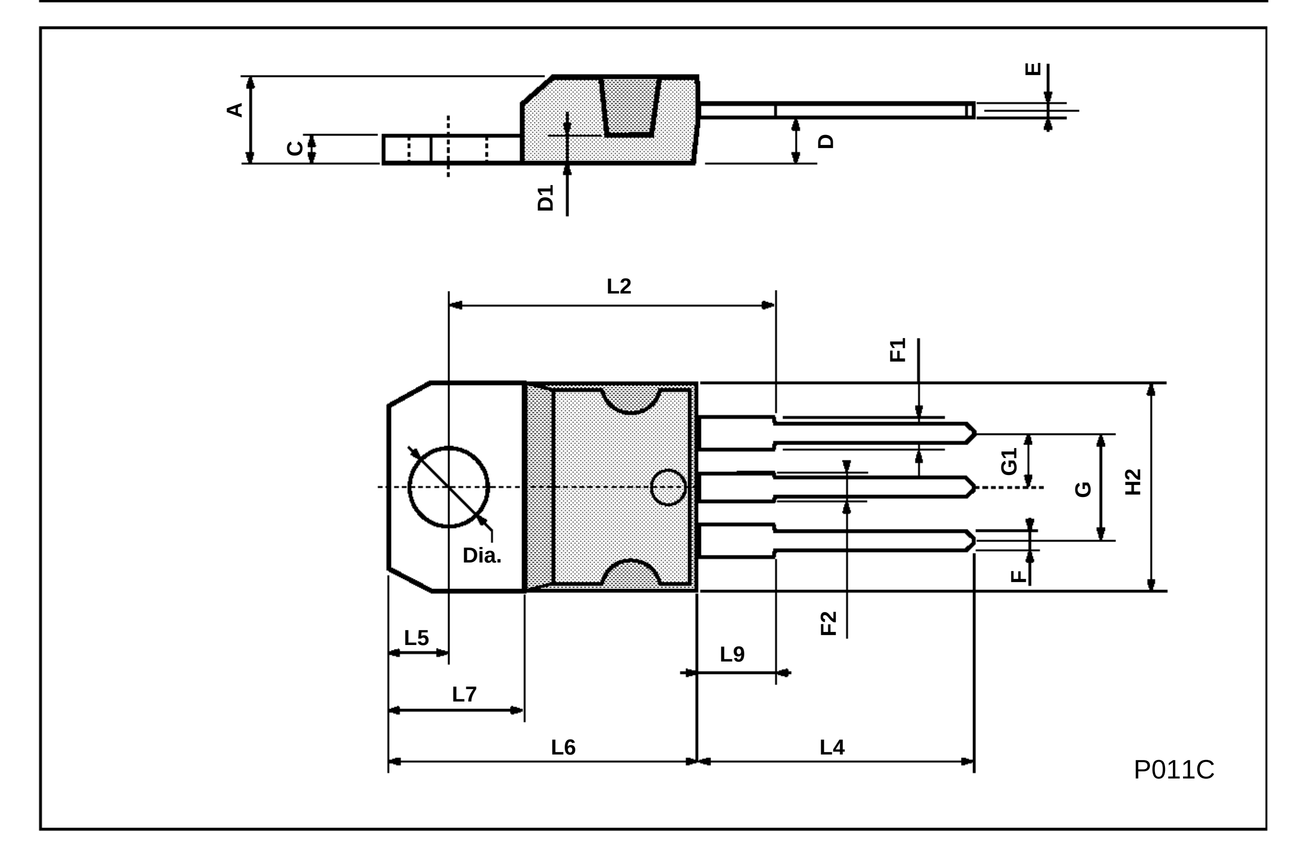
TO-3 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	11.00		13.10	0.433		0.516
B	0.97		1.15	0.038		0.045
C	1.50		1.65	0.059		0.065
D	8.32		8.92	0.327		0.351
E	19.00		20.00	0.748		0.787
G	10.70		11.10	0.421		0.437
N	16.50		17.20	0.649		0.677
P	25.00		26.00	0.984		1.023
R	4.00		4.09	0.157		0.161
U	38.50		39.30	1.515		1.547
V	30.00		30.30	1.187		1.193



TO-220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.2		15.9	0.598		0.625
L7	6.2		6.6	0.244		0.260
L9	3.5		4.2	0.137		0.165
DIA.	3.75		3.85	0.147		0.151




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